Electronic Version
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Claims

[c1] A bipolar transistor, comprising:
a collector;
an intrinsic base overlying said collector;
an emitter overlying said intrinsic base; and
an extrinsic base spaced from said emitter by a gap, said gap including at least one of an air gap and a vacuum void.

[c2] A bipolar transistor as claimed in claim 1, wherein said gap includes only an air gap.

[c3] A bipolar transistor as claimed in claim 1, wherein said gap includes only a vacuum gap.

[c4] A bipolar transistor as claimed in claim 1, wherein said bipolar transistor further includes a semiconductor layer overlying said intrinsic base, wherein said emitter and said extrinsic base overlie said semiconductor layer.

[c5] A bipolar transistor as claimed in claim 4, wherein said gap overlies an opening in said semiconductor layer.

[c6] A bipolar transistor as claimed in claim 5, further comprising a solid dielectric material disposed on said in-

trinsic base in said opening.

[c7] A bipolar transistor as claimed in claim 2, further comprising a solid dielectric material having a lower surface disposed over said gap and an upper surface underlying an overhanging portion of said emitter.

[c8] A bipolar transistor as claimed in claim 1, wherein said bipolar transistor includes a raised extrinsic base, wherein said raised extrinsic base includes a polycrystalline semiconductor layer and a low resistance layer disposed above said polycrystalline semiconductor layer, said low resistance layer including at least one material selected from metals and metal silicides.

[c9] A bipolar transistor as claimed in claim 8, wherein said low resistance layer includes a salicide.

[c10] A bipolar transistor as claimed in claim 1, wherein said intrinsic base includes a layer of a single-crystal semiconductor alloy, said single-crystal semiconductor alloy forming a heterojunction with at least one of said emitter and said collector.

[c11] A method of making a bipolar transistor, comprising:
forming a collector and an intrinsic base overlying said collector;
forming an emitter overlying said intrinsic base and an

extrinsic base spaced from said emitter by a gap, said gap including at least one of an air gap and a vacuum void.

[c12] A method of making a bipolar transistor as claimed in claim 11, wherein said gap includes only an air gap.

[c13] A method of making a bipolar transistor as claimed in claim 11, wherein said gap includes only a vacuum gap.

[c14] A method of making a bipolar transistor as claimed in claim 11, further comprising making a semiconductor layer overlying said intrinsic base, wherein said emitter and said extrinsic base overlie said semiconductor layer.

[c15] A method of making a bipolar transistor as claimed in claim 14, further comprising forming an opening in said semiconductor layer and forming said gap over said opening.

[c16] A method of making a bipolar transistor as claimed in claim 15, further comprising forming an oxide disposed on said intrinsic base in said opening.

[c17] A method of making a bipolar transistor as claimed in claim 12, further comprising a forming a region of solid dielectric material having a lower surface disposed over said gap and an upper surface underlying an overhang-

ing portion of said emitter.

[c18] A method of making a bipolar transistor as claimed in claim 11, wherein said extrinsic base is formed as a raised extrinsic base including a polycrystalline semiconductor layer and a low resistance layer disposed above polycrystalline semiconductor layer, said low resistance layer including at least one material selected from metals and metal silicides.

[c19] A method of making a bipolar transistor as claimed in claim 18, wherein said low resistance layer includes a salicide.

[c20] A method of making a bipolar transistor as claimed in claim 11, wherein said intrinsic base is formed to include a layer of a single-crystal semiconductor alloy, said single-crystal semiconductor alloy forming a heterojunction with at least one of said emitter and said collector.